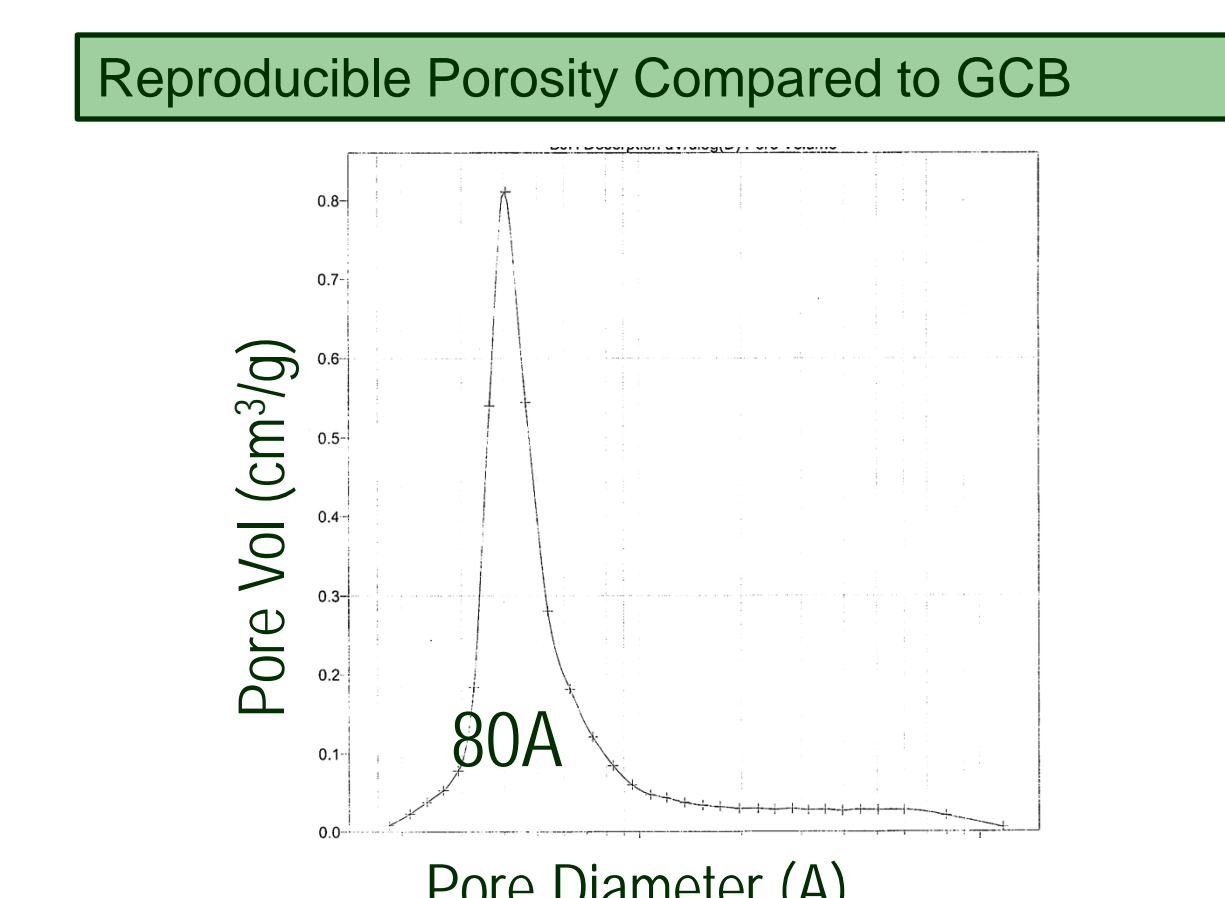
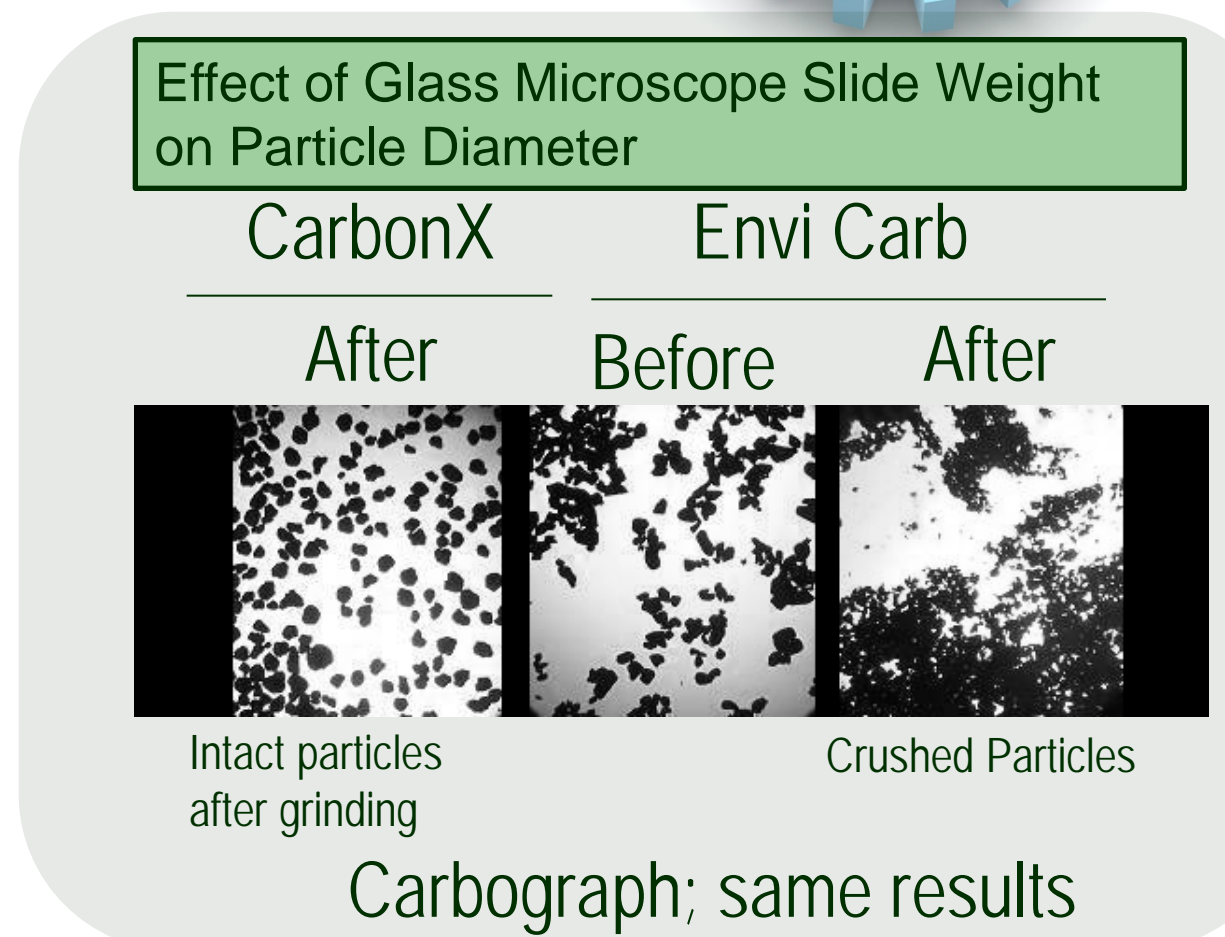
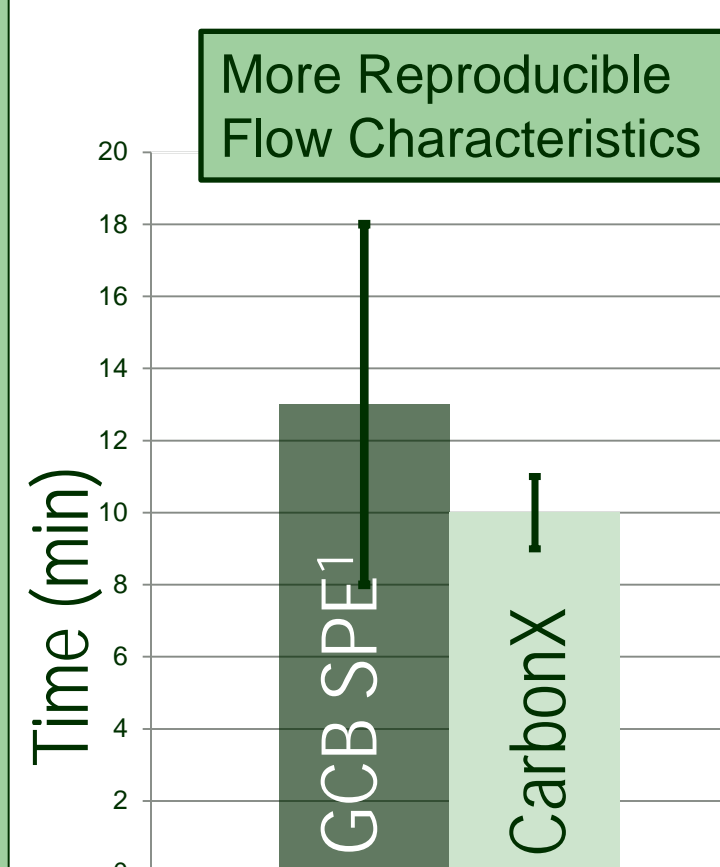
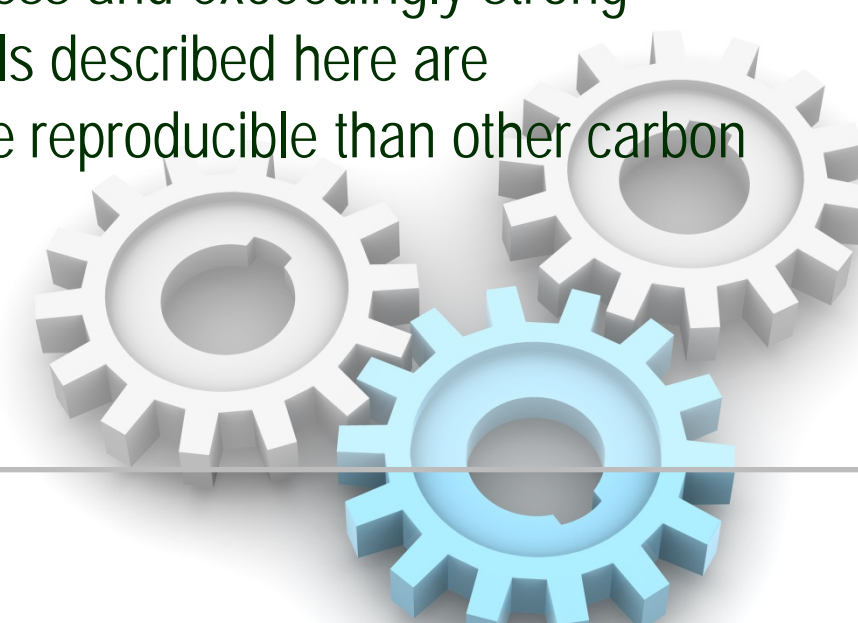
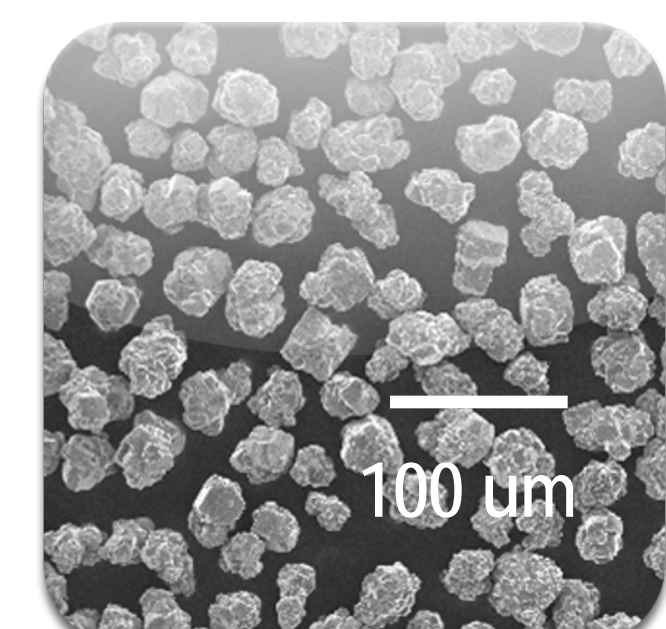


## New Engineered Carbon for Sample Preparation

The novel adsorbents described herein are manufactured by vapor depositing carbon onto mechanically stable porous substrates. The materials are available with many options in particles size, surface chemistries, and pore geometry. These materials are considerably different than commonly used carbon adsorbents such as graphitized carbon black (GCB) which suffers from structural weakness and exceedingly strong sorption of planar pesticides. The materials described here are mechanically stable and therefore are more reproducible than other carbon sorbents on the market.



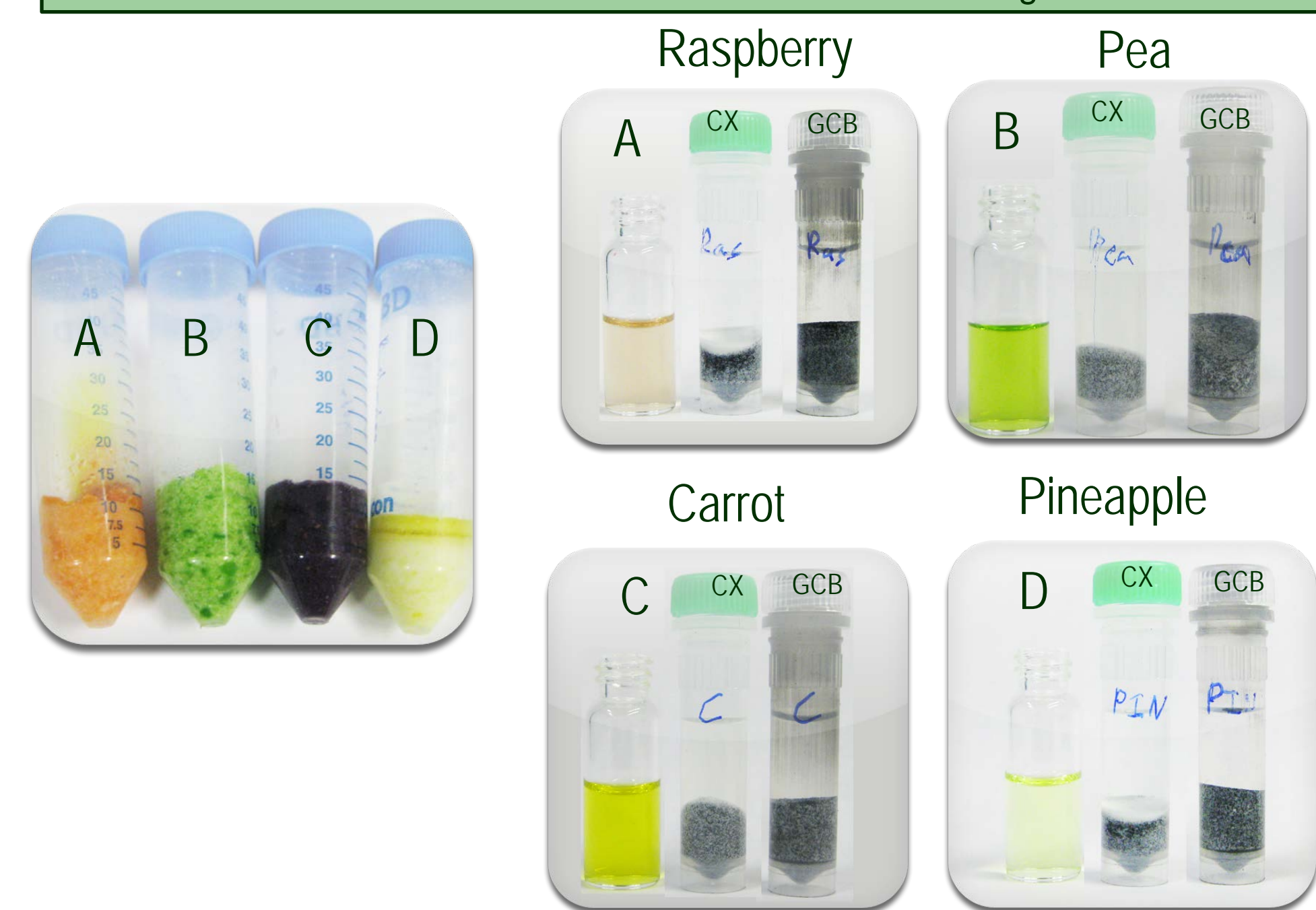
Time to elute 4 mL of CH<sub>2</sub>Cl<sub>2</sub> from 3 mL SPE Cartridge under gravity flow. N = 10. GCB cartridge is commercially packed & sourced.



## CarbonX for QuEChERS

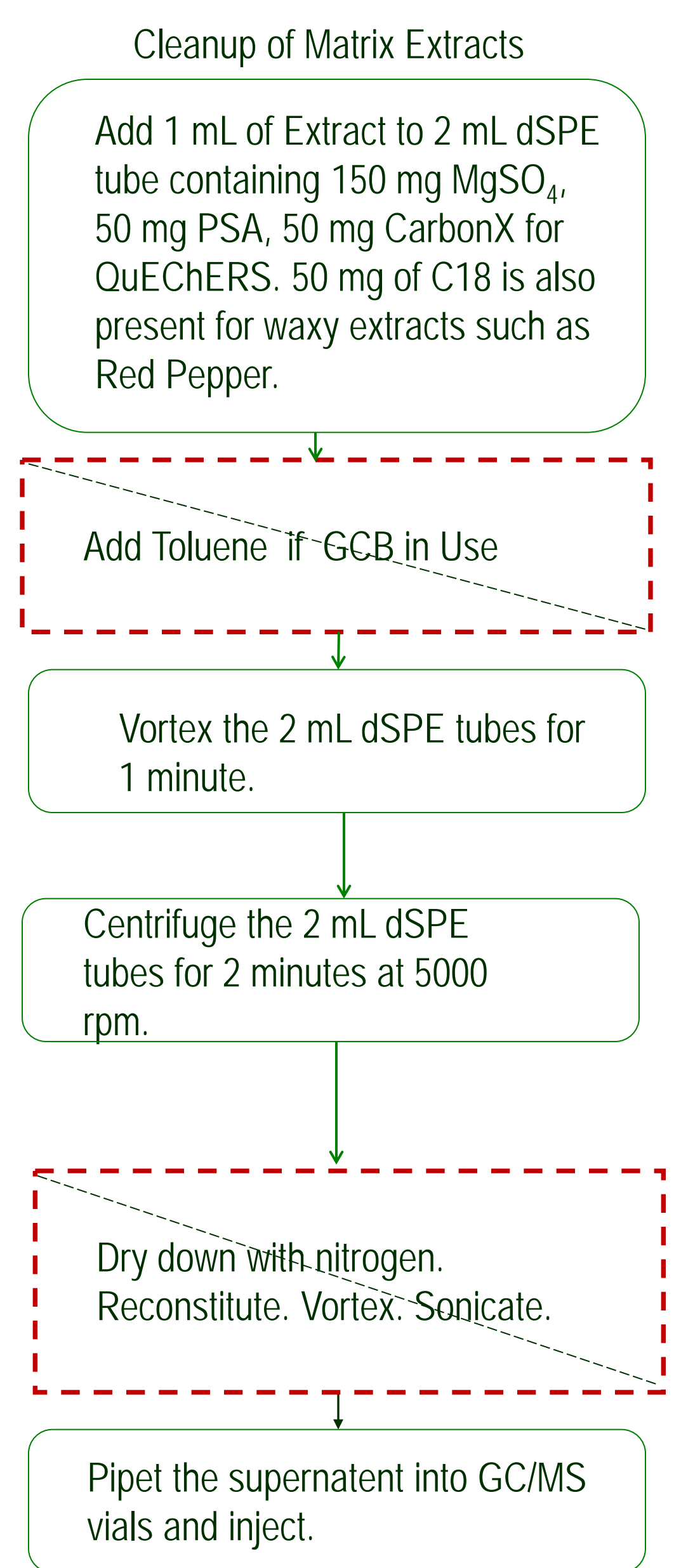
One special formulation of the novel porous carbon-based materials is CarbonX for QuEChERS. This material is a high performance replacement for GCB in dSPE sample cleanup methods. Currently, GCB is used to remove pigment and matrix from fruits and vegetables which are to be tested or screened for pesticide residues. This matrix must be removed before injection of the sample onto a GC/MS or LC/MS/MS. CarbonX for QuEChERS does an excellent job of pigment removal, similar to GCB, but it has the advantage that it does not strongly sorb multi-functional planar molecules.

### Color Removal Performance CarbonX vs GCB for Several Pigmented Matrices



## CarbonX for QuEChERS GC/MS Multi-Residue Pesticide Recoveries

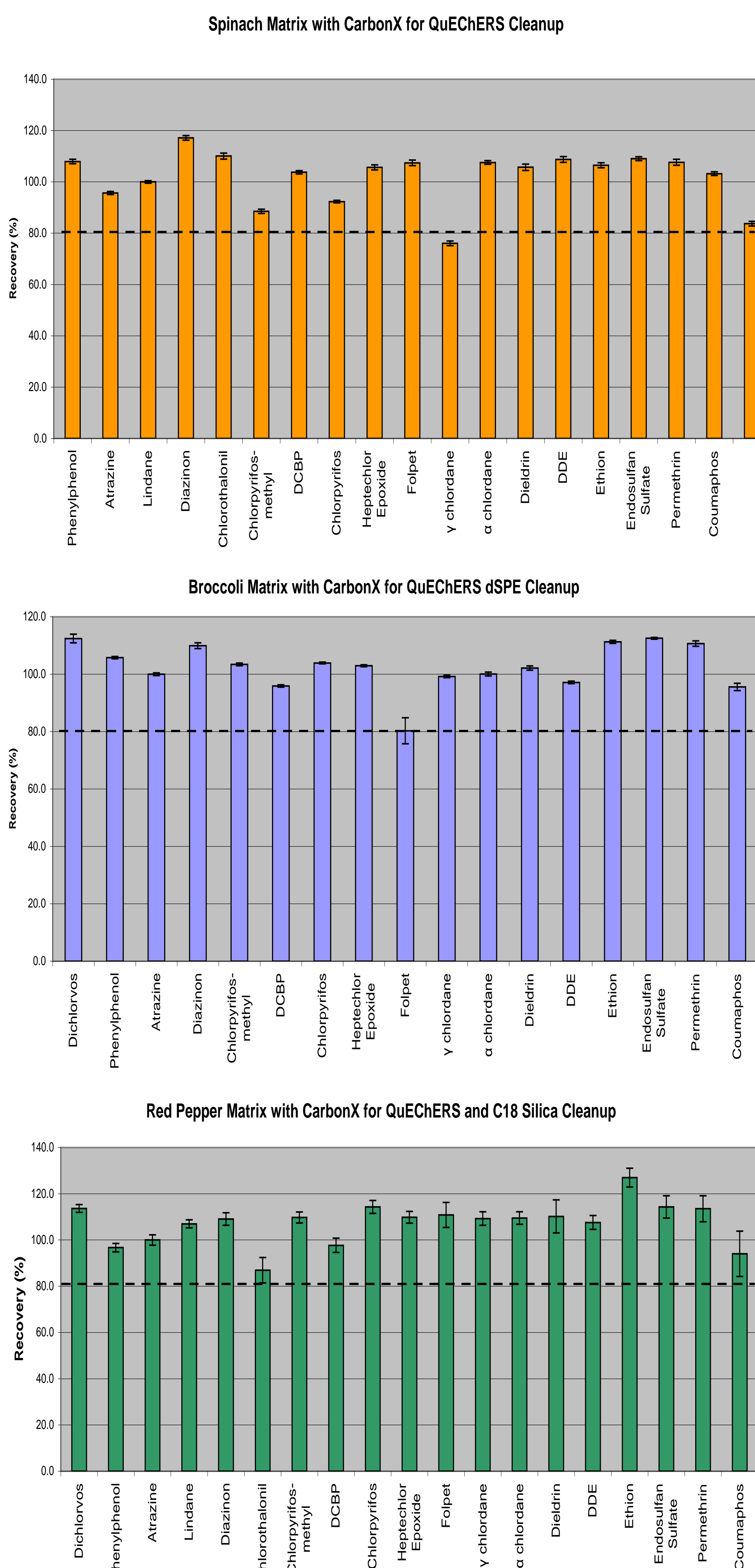
CarbonX for QuEChERS is effective at sample preparation and pigment cleanup across multiple matrices such as Spinach, Broccoli, and Red Pepper.



This cleanup workflow can eliminate time consuming steps. The CarbonX for QuEChERS does an excellent job of removing the pigments present in these vegetable samples without significant loss of pesticide recovery. Toluene is required for the recovery of planar pesticides (Chlorothalonil, DCBP, Folpet, and Coumaphos) on graphitized carbon black (GCB) or any other carbon from any other manufacturer.

## CarbonX for QuEChERS Column SPE Performance

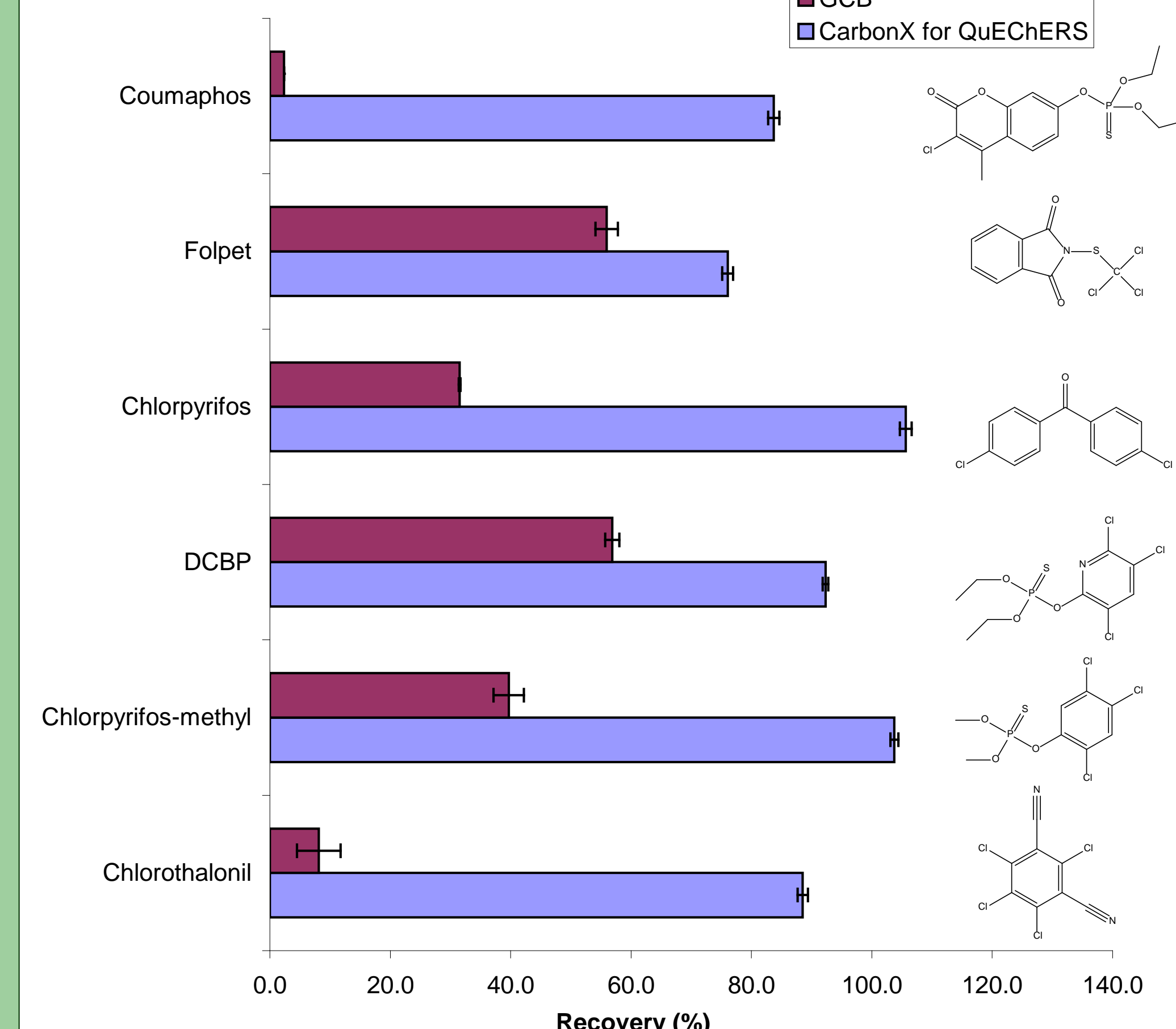
CarbonX for QuEChERS can also be used for column SPE pesticide extractions. For the data shown to the right, a 100 mL pesticide spiked water sample (50 ppb) was sent through a 6 mL cartridge with 1g of either CarbonX for QuEChERS or GCB in it. The pesticides were then eluted with 6 mL of Ethyl Acetate followed by 6 mL of Dichloromethane. The pesticides have recoveries above 80%, with many above 90%. This includes Chlorothalonil, a planar pesticide that strongly adsorbs to GCB.



## CarbonX for QuEChERS and Planar Pesticide Recovery

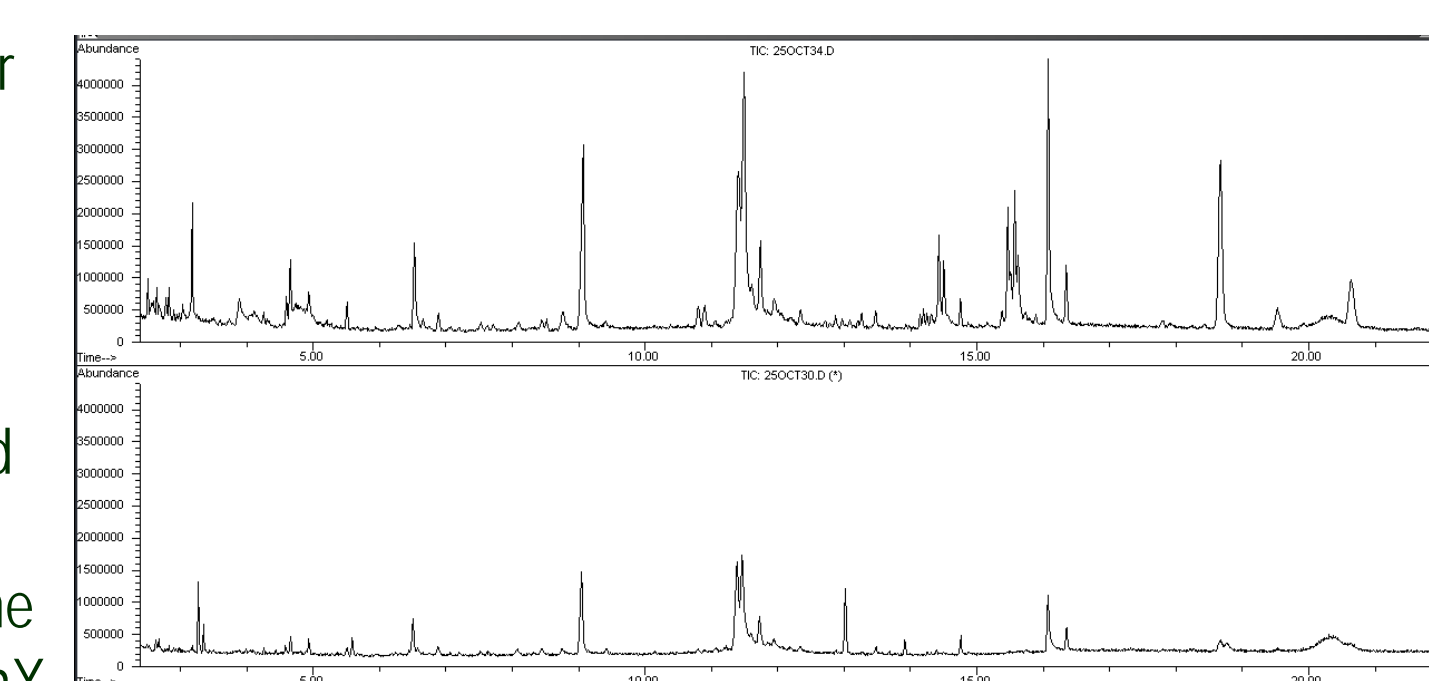
A comparison of the planar pesticide recoveries after cleanup of a spinach matrix with CarbonX for QuEChERS vs GCB demonstrate greatly improved recoveries for CarbonX for QuEChERS. While toluene elution can improve the recovery of these compounds from GCB, this addition also increases the amount of pigment that is present in the final sample and adds steps to the total workflow. Pigment injected onto the GC/MS decreases column and liner lifetimes. CarbonX for QuEChERS achieves both good recoveries and good pigment removal without the need for added toluene.

### Comparison of Planar Pesticide Recoveries After Cleanup with CarbonX for QuEChERS and GCB



## CarbonX for QuEChERS GC/MS Baseline

Cleanup with CarbonX for QuEChERS removes matrix, improves the baseline, and removes pigments. The top chromatogram is raw Red Pepper extract, and the bottom shows the baseline after cleanup with CarbonX for QuEChERS.



## CarbonX for QuEChERS LC/MS Pesticide Recoveries

CarbonX for QuEChERS is also applicable in cleanup for LC/MS/MS amenable pesticides. As can be seen below, similar recoveries of these pesticides are seen for CarbonX for QuEChERS and for GCB.

### Recovery of LC/MS/MS Amenable Pesticides in a Spinach Matrix after dSPE Cleanup with CarbonX for QuEChERS or GCB

